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09/871,001	05/31/2001	Robert Anderson Reynolds III	P-1039B	7524

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EXAMINER

ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 02/13/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/871,001

Applicant(s)

REYNOLDS ET AL.

Examiner

Raymond Alejandro

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↓ The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4. 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Specification*

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: claim 10 recites that the electrical conductivity is less than about 8  $\mu\Omega$ -m, however, the foregoing is not supported by the specification. It is noted that the specification discloses that the electrical resistivity is less than 8  $\mu\Omega$ -m.

### *Claim Objections*

2. Claim 16 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim can only depend from one preceding independent claim or any preceding claim which refers to the same independent claim. See MPEP § 608.01(n). Accordingly, the claim 16 has not been further treated on the merits.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 4-5 and 12-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claims 2 and 13 recite the limitation "the intercalant" in line 1. There is insufficient antecedent basis for this limitation in the claim.

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6. Claims 2, 5, 13 and 16 recite the limitation "a material" in line 1. There is insufficient antecedent basis for this limitation in the claim. Claims 1 and 12 contain an earlier recitation of this limitation.

7. Claims 4 and 15 recite the limitation "a graphite intercalation compound" in lines 1 or 2. There is insufficient antecedent basis for this limitation in the claim. Claim 1 contains an earlier recitation of this limitation.

8. Regarding claim 12, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

9. The term "to an extent necessary" in claim 12 is a relative term which renders the claim indefinite. The foregoing term is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is noted that the degree or magnitude of the foregoing term is uncertain, that is, how much would it be.

10. Claims 17-20 and 22 recite the limitation "the final sheet" in line 1. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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12. Claims 1-10 and 12-20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Mercuri 5846459.

The instant application is directed to a material wherein the disclosed inventive concept comprises the specific graphite intercalation compounds used therein. Other limitations include the specific material and its amount; the layers; the density, the thickness, the electrical conductivity; the thermal conductivity; the electrical resistivity and the resin; in addition, the process for preparing the same is claimed.

As to claims 1 and 12:

Mercuri discloses flexible graphite sheet made by compressing a mixture of relatively large particles of intercalated, exfoliated, expanded natural graphite with smaller particles of natural graphite (abstract). The electrical conductivity is increased (col 1, lines 5-10). It is disclosed that graphite particles are treated with an intercalant of a solution of sulfuric acid and nitric acid, among others (col 2, lines 34-40). Thus, the treated graphite particles are referred as particles of intercalated graphite (col 2, lines 39-41). It is disclosed that the flexible graphite sheet is further compressed (col 3, lines 23-25). The method of forming the graphite sheet is also encompasses (col 10, lines 1-10).

With respect to claims 2 and 13:

It is disclosed that graphite particles are treated with an intercalant of a solution of sulfuric acid and nitric acid, among others (col 2, lines 34-40).

As for claims 3-4 and 14-15:

It is disclosed that the quantity of intercalation solution retained therein may range from 20-150 parts of solution by weight per 100 parts by weight of graphite flakes; it may also be

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limited to 10-50 parts of solution by weight per 100 parts by weight of graphite (col 3, lines 10-25).

With reference to claim 5 and 16:

It is disclosed that graphite is made up of layers planes of hexagonal arrays or networks; wherein these layers are substantially flat (col 1, lines 12-16).

On the matter of claims 6-10, 17-20 and 22:

It is disclosed that flexible graphite has a density of about 3-10 lbs/ft<sup>3</sup> and a thickness of from 0.1-1 inch (col 3, lines 35-40); it is further disclosed that sheet or foils typically has a thickness of 0.002 to 0.180 mm and a density of 10 lbs/ft<sup>3</sup> (col 4, lines 15-25). It is further disclosed that the sheet is 0.030 inch thick and has an electrical resistivity of 10.500  $\mu\Omega$ -m (col 4, lines 40-46). In addition, since the specific intercalated graphite material has been taught as well as the specific density and electrical resistivity, it is understood that the specific electrical and thermal conductivity is an inherent property of the material due to the intrinsic nature of the flexible-intercalated-exfoliated graphite material.

Thus, the claims are anticipated.

13. Claims 1-2, 5-13 and 16-22 are rejected under 35 U.S.C. 102(b) as being anticipated by Shane et al 3404061.

As to claims 1-2 and 12-13:

Shane et al disclose a flexible sheet material consisting of graphite (col 1, lines 13-17); the flexible graphite material was first expanded and then compressed (col 1, lines 25-28/col 7, lines 48-51). It is disclosed that interlayer attack of graphite particles is achieved by subjecting

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the graphite particles to oxidizing conditions wherein such oxidizing mixtures may be employed to controlled interlayer attack and may be nitric acid, chromic acid, and the likes (col 7, line 68 to col 8, line 25).

As for claims 5 and 16:

It is disclosed that the invention provides laminate or composite structures comprising pliable graphite sheet material (col 1, line 48-51). It is also taught that graphites are made up of layer planes of hexagonal arrays or networks (col 2, lines 38-42).

On the matter of claims 6-10, 17-20 and 22:

It is disclosed that flexible graphite has a density of between 40-120 lbs/ft<sup>3</sup> (TABLE II); a thermal conductivity between 0.2-1.5 BTU-ft/hr-ft<sup>2</sup>F (TABLE II/col 13, lines 10-15); an electrical resistivity of 1000  $\mu\Omega$ -cm (TABLE II); the thickness ranges from about 0.0001 to about 0.500 inch (col 13, lines 34-37); the density of the graphite material can range from about 5-137 pounds/ft<sup>3</sup> (col 13, lines 35-41). In addition, since the specific intercalated graphite material has been taught as well as the specific density, electrical resistivity and thermal conductivity, it is understood that the specific electrical conductivity is an inherent property of the material due to the intrinsic nature of the flexible-intercalated-exfoliated graphite material.

Regarding claims 11 and 21:

It is disclosed that the quantity of the phenolic resin used was about 30 % by weight of the graphite masses (col 7, lines 14-21).

Thus, the claims are anticipated.

***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 11 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mercuri 5846459 as applied to the preceding claims above, and further in view of Mercuri et al 5902762.

Mercuri '459 is applied, argued and incorporated herein for the reasons above. However, Mercuri'459 do not disclose the graphite sheet containing the specific amount of resin.

Mercuri et al'762 disclose that a flexible graphite sheet immersed in liquid resin (col 3, lines 12-16); wherein a control sample retained only 5 % by weight of resin (col 4, line 23-26).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to make the graphite sheet of Mercuri'459 containing the specific resin amount of Mercuri et al'762 as Mercuri et al'762 teach that it has been proposed to increase the sealability of flexible graphite sheet or foil by impregnating the same with resin. Thus, an enhanced sealing feature within the graphite sheet is obtained.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (703) 308-2383. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro  
Examiner  
Art Unit 1745

  
Patrick Ryan  
Supervisory Patent Examiner  
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